

UDC 666.3:666-46:66.012.002

## EFFICIENT TECHNOLOGY AND EQUIPMENT FOR PRODUCTION OF FLOWERPOT SETS

V. A. Aleko<sup>1</sup>Translated from *Steklo i Keramika*, No. 10, pp. 28–29, October, 2000.

---

The main criteria for the selection of a product range in ceramics are formulated. The technological modules and components of mini-works for making flowerpot sets are described.

---

Ceramics continue gaining new positions on the consumer goods market. This is aided by the development of private mini-production companies (shops, production divisions and units, mini-works) for consumer and engineering ceramic products based on material-saving technologies [1]. Numerous specialized shops and fairs selling ceramics now exist, both attached to such mini-production companies and independent traders. On the other hand, it is not easy in such conditions to find a proper marketplace, a niche, to develop one's own new products or select a reasonable and stable product range.

The Slavyanskii Institute of Ceramics Machine Building [2] is engaged in solving these problems and offers practical assistance to manufacturers in setting up the manufacture not only of traditional ones, but also of new or upgraded ceramic products. The Institute has analyzed the situation on the ceramic market in the Donetsk region, summarized, and formulated the main criteria affecting the selection of a product range.

It is known that a stable product range cannot exist without a constant demand. The latter is assured by the renewal of product ranges and upgrading of individual products. The existence of a demand for certain products can be identified by opinion polls or by producing prototype product lots.

An appropriate name and purpose of a product determine its practical and aesthetic functions. Materials and technology affect the mass-scale production, production cost, and the economic efficiency. An important factor is the possibility of using the same material or its technological waste for manufacturing additional products, such as souvenirs, dishes, containers, etc.

The performed analysis revealed the absence of large-size ceramic flowerpots for flowers and decorative plants. This was verified in inspecting residential and industrial premises.

Very frequently flowers and decorative plants in contemporary mini-markets, banks, offices, and houses grow in buckets, jars, pans, and barrels which do not fit in with the architectural design and do not harmonize with the contemporary furniture and finishing materials. Therefore, arranging a specific interior decoration for each room, hall, or lobby requires an individual solution. An element for interior design can be floral decoration with a floral set designed for this purpose. The set usually includes a large flowerpot and a support for it. The Institute started the production of such sets and developed a design of a modular mini-works, which includes modules for mixture preparation, molding, drying, glazing (by request of the customer), firing, storing, and packaging.

The annual output of the mini-works is 100 thousand floral sets calculated for two-shift operation of the mixture-preparing unit, one shift in molding, and three shifts in drying and firing.

### Technical characteristics of the mini-works

Output, pieces/day . . . . .	295
Installed power, kW . . . . .	251
Area occupied, m <sup>2</sup> . . . . .	1440
Personnel . . . . .	27
Annual consumption:	
gas, m <sup>3</sup> . . . . .	90,100
electricity, kW · h . . . . .	731,000
water (technical), m <sup>3</sup> . . . . .	1093

### Main technological equipment of the mini-works

Telpher . . . . .	1
Ball mills:	
MSh-2800 . . . . .	2
MSh-500 . . . . .	2
Membrane pumps:	
NM-1/20 . . . . .	1
NM-3/16 . . . . .	2

---

<sup>1</sup> Slavyanskii Institute of Ceramics Machine Building, Ukraine.

Propeller mixer:	
MP-500 . . . . .	2
MP-950 . . . . .	1
M-500 . . . . .	2
Vibrating screen SV-500 . . . . .	2
Filter press FP-500 × 50 . . . . .	1
Vacuum press VP-200 . . . . .	1
Semiautomatic molding machine ES. . . . .	1
Glaze suspension concentration unit . . . . .	1
Drying cars . . . . .	84
Chamber drier . . . . .	6
Glazing chamber . . . . .	1
Furnace buggy . . . . .	6
Gas furnace . . . . .	1

A specific feature of the technology and equipment of the mini-works consists in using semiautomatic molding machines ES produced by Schreiber Keramik Maschinen GmbH (Germany). The machine efficiency is 7–9 pieces per minute. Molding is controlled by a hydraulic system of 1.5 kW power. Control is based on the relationship between the stresses arising in molding and the material deformation, which is based on the proportionality limit equal to the yield point, and this makes it possible to adjust smoothly the rate and the pressure, taking into account the product range and the type and hardness of the ceramic mixture. The control display panel makes it possible to set the parameters for molding and product removal from the mold and thus to affect the productivity.

Molding is carried out in metal molds employing metal punches, which significantly decreases the labor consumption and the production cost. The existence of detachable molds and the easy and simple mold replacement technology makes it possible to produce different products within the permissible size range on the same machine (flowerpots, bowls, cups, etc.).

A chamber drier with reverse heat-carrier feeding was developed and tested in drying molded products, which made it possible to intensify the sintering process and improve the product quality by decreasing the maximum difference be-

tween the moisture content on the surface and inside the product. In laboratory tests, not only was the amount of faulty articles reduced, but the drying period was shortened as well.

The firing module is based on a chamber batch gas-heated furnace with a pull-out bottom. The furnace has up-to-date heat insulation made of mullite-silica rolled material MKRR-130 and plates ShPGT-450. The furnaces are equipped with a natural ventilation system, temperature control devices, and a control panel. The technology meets the contemporary standards:

- accelerated firing (the firing cycle is 11 h);
- complete automation of the firing process;
- monitoring of the composition of combustion products in atmospheric outbursts;
- uniformity of the thermal field due to the use of long-flame high-speed burners.

The manufacture of flowerpot sets and other ceramic products at mini-works consists of standard processes of ceramic production. The main raw materials for faience and semiporcelain mixtures are refractory clays and kaolins, quartz sand, pegmatite, and dolomite. The main components for low-temperature glazes are different types of frit. Terra cotta and majolica mixtures can be prepared based on low-melting red-burning clays of medium plasticity found at different deposits.

The fired articles after 100% visual and acoustic control are sent to the finished goods warehouse, where they are packed and sent to consumers.

The simple technology and the virtually infinite material resources make the production of floral sets especially promising.

## REFERENCES

1. V. A. Aleko, N. P. Begunov, and M. B. Lebedev, "Modular construction for mini-works," *Steklo Keram.*, No. 1, 23–24 (1997).
2. N. P. Begunov, "Institute of Ceramics Machine Building," *Steklo Keram.*, Nos. 7–8, 43–44 (1994).